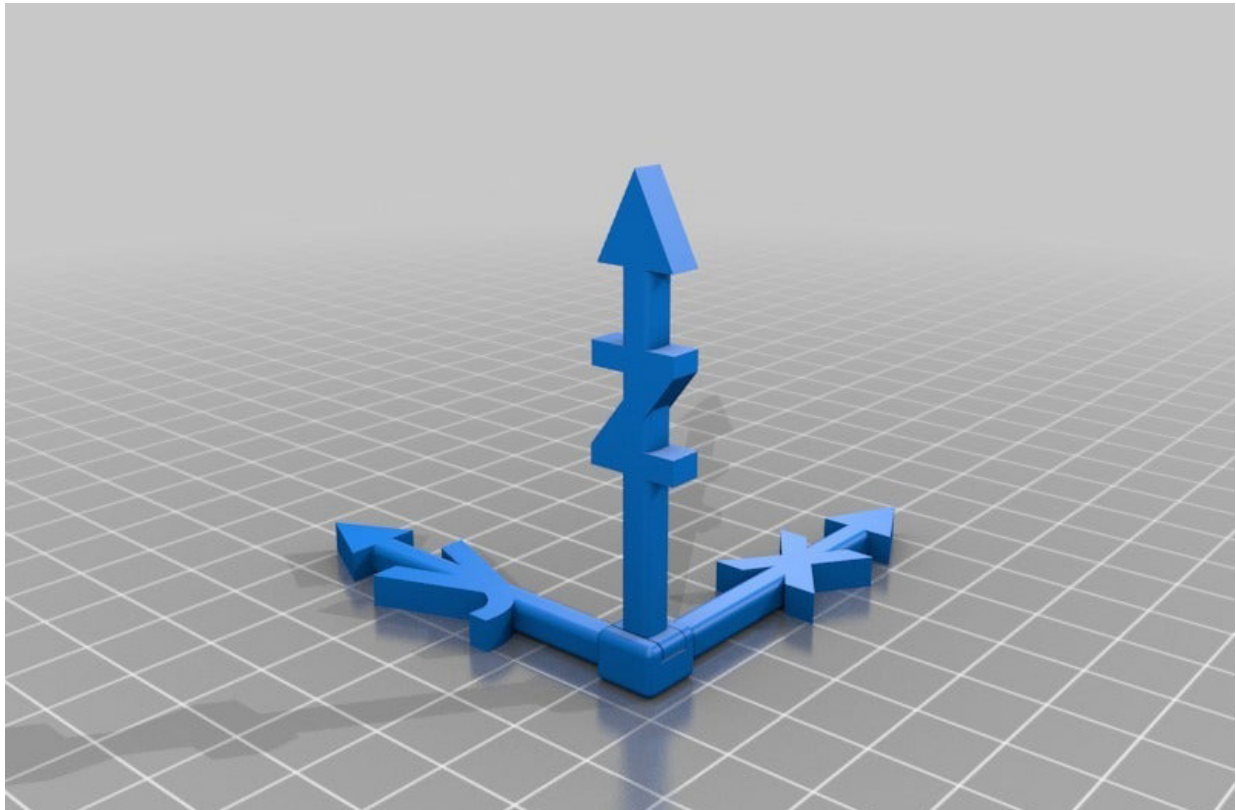


THE
Cartesian Coordinate
SYSTEM EXPLAINED



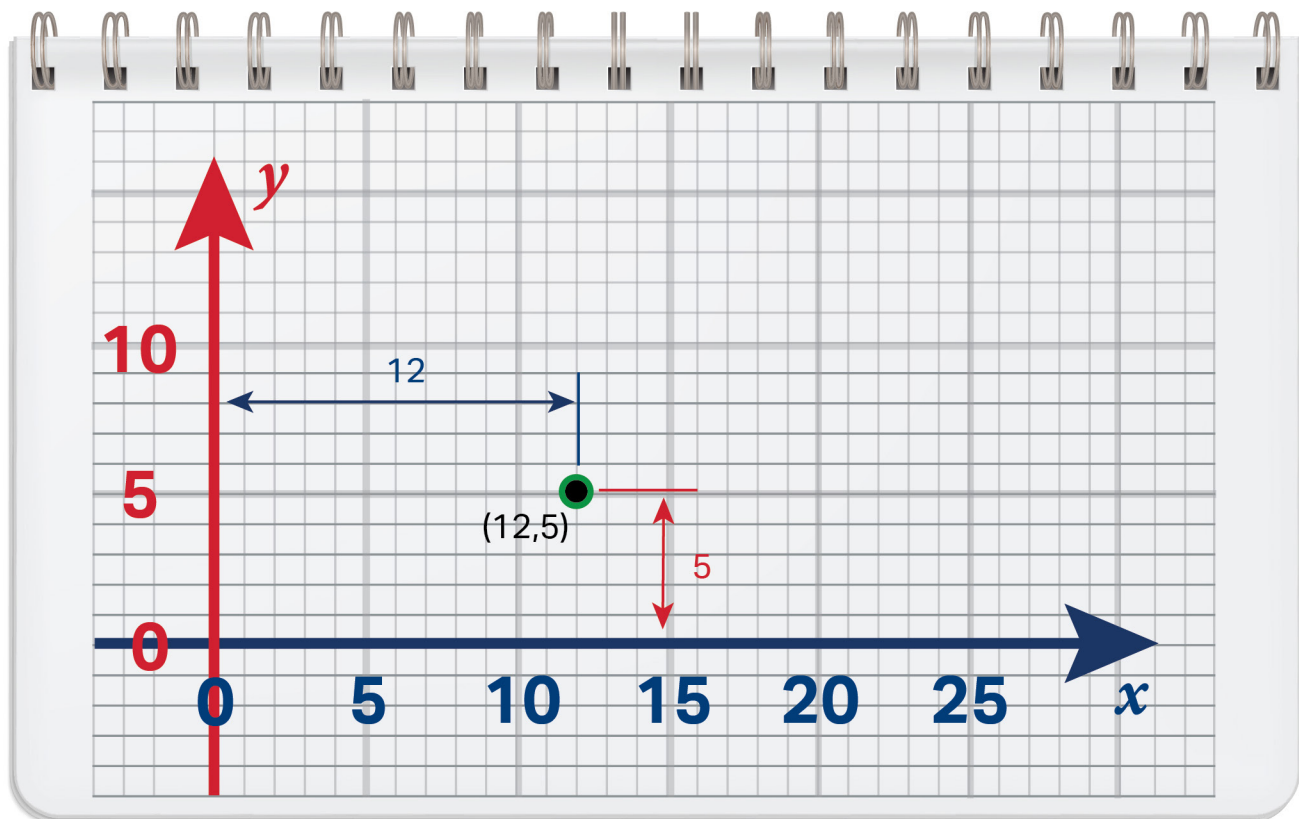
**WHEN RELIABILITY MATTERS
CONNECT TO CONFIDENCE**



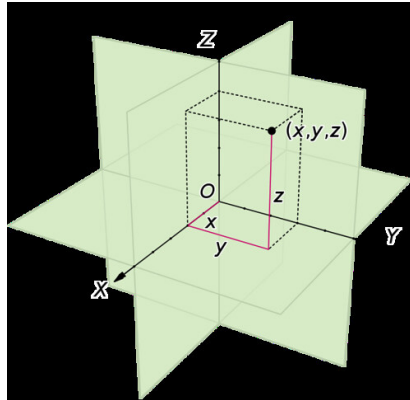
What is the Cartesian Coordinate System?

There is a good chance that you already know what the Cartesian coordinate system is, at least in concept, but simply did not know the term. It is a way to map points in 3-dimensional space by assigning values to each direction. Think of it like a map. If you were walking around New York City from Central Park to the Empire State Building, you would have to travel a certain distance west and a certain distance south. With these two values, you can figure out how far it is between the two locations. But what if you wanted to know how far it is from Central Park to the top of the Empire State building? You would need to have another direction to describe how tall the building is. This is where the Cartesian coordinate system comes in.

In the Cartesian coordinate system, moving horizontally left and right is considered moving along the X-axis. Similarly, moving up and down is the Y-axis. You can use these two points to see how far along a point is on a graph like the one shown below. The green point on the graph is 12 units in the X direction and 5 units in the Y direction.



X and Y axes can be used to describe a point in two dimensions, but it could never be used to illustrate more than just a flat surface. You need a third axis, called the Z-axis, to describe the depth of an object. If X-axis is left and right and Y-axis is up and down, then the Z-axis is in and out. The following graph is what it would look like when you add the Z-axis in:



How Does This Relate to Vibration?

Everything in our physical world exists and moves in these in these 3 dimensions. Therefore, everything in our world vibrates in these 3 directions. With a single axis sensor, the only measurement taken is in the Z axis. This is helpful in many cases since this is in line with the vibration coming from the machine you mounted the sensor to which in most cases would be the largest source of vibration. If you have a piece of equipment that could be vibrating in multiple directions, you would need a sensor that can measure them all simultaneously. Enter the triaxial sensor.

The wide variety of CTC triaxial sensors, such as the TREA330 below, have been designed with the Cartesian coordinate system in mind. In relation to how the sensor is marked, you can see that the three axes follow the same principle that the X-axis is left to right, the Y-axis is up and down, and the Z-axis is in and out in relation to the surface on which it is mounted. The circle around the Z engraved on the sensor itself is used to describe an in and out motion that cannot be visualized on the two-dimensional surface of the sensor body.



TREA330 Premium Compact Triaxial Accelerometer, 100 mV/g

- ▶ Frequency Response ($\pm 3\text{dB}$): 30-900,000 CPM
- ▶ Dynamic Range: $\pm 50\text{g}$, peak
- ▶ Power Requirements Voltage Source: 18-30 VDC
- ▶ Temperature Range: -65 to 250°F
- ▶ Case Material: 316L Stainless Steel
- ▶ Connector: 4 Pin

CTC is the world leader in the design and manufacture of industrial accelerometers, piezo velocity transducers, 4-20 mA vibration sensors, and proximity probes as well as all related mounting hardware, cabling, and junction boxes. Our products enable efficient vibration monitoring for predictive maintenance in a wide variety of industries. Industries served include cement, mining, petrochemical, food & beverage, auto, steel, wind, paper & pulp, power generation, water & wastewater treatment, pharmaceutical, hospitals, bottling, and more. Our mission is to offer the widest variety of accelerometers and vibration hardware products, which are compatible with data collectors and online monitoring systems, as well as the tools for installation.



The CTC product line features vibration analysis hardware for heavy industry.

All CTC products are backed by our unconditional, lifetime warranty. If any CTC product should ever fail, we will repair or replace it at no charge.



The PRO line offers the industry's most reliable proximity probe sets.

All PRO products are backed by a lifetime warranty on materials and workmanship. PRO will repair or replace any of our products as long as the product was not subjected to misuse, neglect, natural disasters, improper installation, or modification.

All stock products may be returned for a 25% restocking fee if returned in new and unused condition within 90 days of shipment. Built-to-order and private-label products qualify for a 50% refund if returned in new and unused condition within 90 days of shipment. Custom products are quoted and built specifically to the requirements of the customer, which may include completely custom product design or private-labeled versions of standard products for OEM customers. Custom products are non-cancellable, non-returnable, and non-refundable.

Image Credit: Notebook (page 2) courtesy of upklyak / Freepik

